Applied and Industrial Mathematics

Undergraduate thesis topics

C. Sean Bohun (possible topics: 1 of 2)

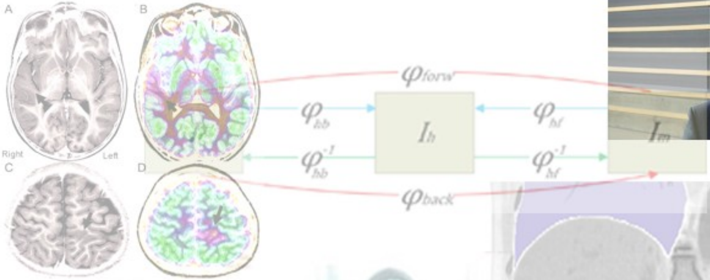
- Predicting and prescribing distortion of thin glass sheets.
- Investigate complex chemical processes. Examples include: the carbonate system, responsible for ocean acidification; the Acheson process, responsible for commercial production of silicon carbide.
- Tissue engineering: the optimal placement of cells using magnetic micro-beads.

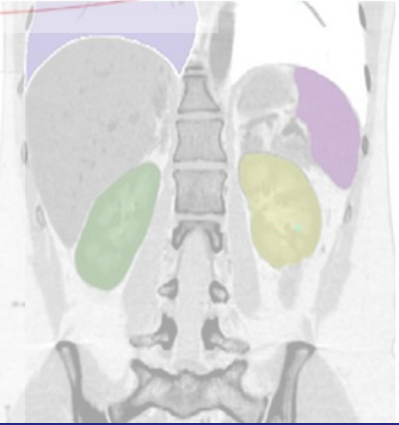
C. Sean Bohun (possible topics: 2 of 2)

- Modelling processes that characterize unknown samples to increase their current capabilities. Examples include: rotating disk apparatus, high resolution melt analysis and cyclic voltammetry.
- Develop mathematical tools to help design high power tuneable lasers.
- Model biological processes. Examples include: brain vascular systems and bone remodelling.

Jane Breen (possible topics)

- Clustering algorithms in directed networks (with applications to road traffic dynamics)
- Kemeny's constant and graph connectivity
- Sensitivity analysis of Markov chain models





Mehran Ebrahimi (possible topics)

- Medical image registration
- Medical image segmentation
- Medical image fusion

Greg Lewis (possible topics)

- Transitions in atmospheric flow patterns
- Mathematical models for electro-location in weakly electric fish
- Mathematical aspects of MRI

Lennaert van Veen (possible topics)
NOTE: Dr. van Veen is on sabbatical in 2021/2022

- Phase transition in interface formation. Will include elements of: theory of interface formation, stochastic partial differential equations, numerical methods, data analysis.
- Bi-stability and critical noise. Includes: "flickering" noise in dynamical systems, the telegraph process, simple simulations.
- Stability analysis of shear flows. Will include elements of: Navier-Stokes flow, energy methods, Squire's theorem, Orr-Sommefeld equations.